

**REMARKS**

Claims 8-10, 18-20, 28-30, and 38-40 are all the claims presently pending in the application. By this amendment claims 8-10, 18-20, 28-30, and 38-40 are amended. The amendments introduce no new matter.

A Request for Continuing Examination and the corresponding fee are filed concurrently herewith.

It is noted that Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 8-10, 18-20, 28-30, and 38-40 stand rejected under 35 U.S.C. §103(a) over Horimai (U.S. Patent Application Publication No. 2004/0062178) in view of Fuji (U.S. Patent No. 5,465,248).

This rejection is respectfully traversed in the following discussion.

**THE CLAIMED INVENTION**

The claimed invention is directed to an apparatus and method for holographic recording and reproduction. As defined, for example, in independent claim 8, a holographic recording apparatus records a piece of data on a holographic medium. The holographic medium is in the form of a flat plate which includes a recording layer. The recording layer comprises a photosensitive material. The recording is achieved by an interference pattern of a coherent light beam. The apparatus includes a pickup, a driving unit, and a control unit.

The pickup includes an objective lens which focuses the coherent light beam. The

pickup moves the objective lens along a recording track of the holographic recording medium and detects reflected light from the recording track to perform focus- and tracking-servo control. The pickup detects a marker provided in the holographic recording medium to generate a marker detection signal.

The driving unit drives the objective lens, or a mirror arranged in an optical path of the coherent light beam to the objective lens, such that the converging position of the objective lens tracks the marker using the marker detection signal.

The control unit performs recording on the recording layer.

In a conventional holographic recording apparatus and method, in order to record information in a certain volume in a recording medium with high density, the recording is performed for that volume of several cubic millimeters in a multiplexing manner using angular multiplexing or wavelength multiplexing. Signal light and/or reference light must be fixed at a predetermined recording or reproducing position in the recording medium for a predetermined time period in accordance with the sensitivity of the recording medium and photodetector. This causes difficulty in performing high-density recording and reproduction at high speed. Moreover, a high-precision paging control mechanism is required, which makes size reduction more difficult.

The claimed invention, on the other hand, avoids limitations on recording or reproducing speed, so as to enable high-speed and high-density recording and reproduction. The claimed invention determines the relative velocity of a converging position of the objective lens with respect to the holographic recording medium. The driving unit moves an incident optical path based on the relative velocity such that a moving distance of the

Application No. 10/522,342

Attorney Docket: US01-04066PCT (FUJI.065)

converging position of the lens relative to the recording medium falls within half a period of the pitch of interference fringes during a time period for recording or reproducing the piece of data.

### **THE PRIOR ART REJECTIONS**

The Examiner alleges that the claimed invention is obvious over Horimai in view of Fuji. This rejection is respectfully traversed.

The Examiner alleges that Horimai teaches certain features of the claimed invention. Applicants submit, however, that there are elements of the claimed invention, which are neither taught nor suggested by Horimai.

With regard to independent claim 8, Applicants submit that Horimai fails to disclose or suggest at least “a pickup including an objective lens which focuses the coherent light beam, for moving the objective lens along a recording track of the holographic recording medium and detecting reflected light from the recording track to perform focus- and tracking-servo control, and for detecting a marker provided in the holographic recording medium to generate a marker detection signal,” or “a driving unit for driving the objective lens or a mirror arranged in an optical path of the coherent light beam to the objective lens such that the converging position of the objective lens tracks the marker using the marker detection signal,” as recited in the claim. Similar features are recited in independent claims 18, 28, and 38.

Fuji fails to overcome this deficiency of Horimai. Fuji fails to disclose or suggest at least “a pickup including an objective lens which focuses the coherent light beam, for moving

the objective lens along a recording track of the holographic recording medium and detecting reflected light from the recording track to perform focus- and tracking-servo control, and for detecting a marker provided in the holographic recording medium to generate a marker detection signal,” or “a driving unit for driving the objective lens or a mirror arranged in an optical path of the coherent light beam to the objective lens such that the converging position of the objective lens tracks the marker using the marker detection signal,” as recited in independent claims 8, 18, 28, and 38.

This feature is supported in the specification and at least in figures 3-5, reference 51. Similar language is recited in independent claims 18, 28, and 38.

According to the present invention, recording and reproduction of the data is performed while performing a tracking operation which uses a marker provided in the recording medium.

More specifically, a detection signal of the marker 51 is sent to the main controller 30. The objective lens driver 32 drives the objective lens 27, under the control of the main controller 30, such that a converging position of the objective lens 27 tracks the marker 51 on the basis of the detection signal of the marker 51 (see, for example, p. 21, lines 2-26; steps S12-S13 in Fig. 8; p. 23, lines 1-9). The tracking operation is performed by driving the objective lens or a mirror arranged in an optical path of the coherent light beam to the objective lens (see, for example, p. 28, lines 21-26).

The tracking operation is performed such that the relative velocity falls within a predetermined range at least during a predetermined period (see p. 23, lines 4-9; p. 40, lines 1-6), or a moving distance of the converging position relative to the holographic recording

medium fall within half a period of the pitch of interference fringes (see, p. 24, lines 24-26) at least during a time period for recording/reproducing the piece of data (i.e., page data).

On the other hand, Horimai discloses a recording medium 1 including address servo areas 6 and information recording areas 7. Horimai, p. 4, para. [0067]-[0069]. However, the address servo area 6 and information recording area 7 are arranged in different tracking positions. Horimai, Fig. 1. The address servo area 6 and the information recording area 7 are arranged one after the other on a recording track TR. Horimai, Fig. 1.

According to the present invention, recording and reproduction of the data are performed while performing tracking of the marker 51. Stated in another way, the recording and reproduction of data are performed simultaneously or concurrently with the performance of the tracking operation of the marker. Thus, a relative distance error between the converging position of the light beam and the recording medium can be much smaller. Therefore, high-accuracy recording and reproduction of the data can be provided.

Thus, turning to the clear language of the claims, Applicants submit that Horimai fails to teach or suggest “a pickup including an objective lens which focuses the coherent light beam, for moving the objective lens along a recording track of the holographic recording medium and detecting reflected light from the recording track to perform focus- and tracking-servo control, and for detecting a marker provided in the holographic recording medium to generate a marker detection signal,” or “a driving unit for driving the objective lens or a mirror arranged in an optical path of the coherent light beam to the objective lens such that the converging position of the objective lens tracks the marker using the marker detection signal,” as required by independent claims 8, 18, 28, and 38.

Application No. 10/522,342

Attorney Docket: US01-04066PCT (FUJI.065)

Therefore, Horimai, alone and in combination with Fuji, fails to teach or suggest all features of the independent claims. Applicants respectfully request withdrawal of the rejections over Horimai in view of Fuji.

Application No. 10/522,342  
Attorney Docket: US01-04066PCT (FUJI.065)

## CONCLUSION

In view of the foregoing, Applicant submits that claims 8-10, 18-20, 28-30, and 38-40, all the claims presently pending in the application, are patentably distinct over the prior art of record and are allowable, and that the application is in condition for allowance. Such action would be appreciated.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned attorney at the local telephone number listed below to discuss any other changes deemed necessary for allowance in a telephonic or personal interview.

To the extent necessary, Applicant petitions for an extension of time under 37 CFR §1.136. The Commissioner is authorized to charge any deficiency in fees, including extension of time fees, or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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